

Expert Group Member 3:

Consider an episode of **MASTER CHEF** (or similar).

Identify the *physical and chemical changes* that take place.

Draw a simple **diagram** or sketch (or find one!) to show at *particle level* what is occurring in each.

Construct a table to *compare physical and chemical changes*. Include your examples in the table.

Describe *how you could demonstrate* the difference between physical and chemical changes to primary school aged children.

Physical changes

Concerned with energy & states of matter. It does not produce a new substance. Changes in state or phase (melting, freezing, vaporization, condensation, sublimation) are physical changes.

Examples of physical changes include crushing a can, melting an ice cube, and breaking a bottle.

EXAMPLES

- 1- Cutting paper: When you cut a piece of paper, there will be smaller pieces of paper while the quality of the paper didn't change and it's the same paper before cutting
- 2- Boiling of water: When you heat the water until it boils, it changes to vapour but its chemical structure doesn't change and it is the same H₂O before boiling.
- 3- Breaking a glass: When you break a glass, it will break to smaller parts but its qualities won't change
- 4- Dissolving of sugar in water: when you dissolve some sugar in water, it is a physical change. Because if you boil that water then you can see that sugar again. So dissolving sugar in water doesn't change the chemical qualities of sugar and only change its physical structure.

Chemical changes

Changes take place on the molecular level. A chemical change produces a new substance

Examples of chemical changes include combustion (burning), cooking an egg, rusting of an iron pan, and mixing hydrochloric acid and sodium hydroxide to make salt and water.

EXAMPLES

- 1- Cooking of the raw food: in this process the raw food will change to the cooked food. The food doesn't have the same quality
- 2- Digestion of food: your body can't use the foods before digestion. Digestion makes the very small parts and molecules in order that your body can use the food.
- 3- Burning of wood in fireplace: when the wood is burning, it will transform to ash
- 4- Rusting of iron: When it is raining a lot, irons in the house structure become rusted and they won't have the qualities that iron has, because it had a reaction with oxygen.

It was difficult to do this for a whole episode of Master Chef, but here is a recipe of their Crème Brûlée. The video can be seen at: <http://www.masterchef.com.au/creme-brulee.htm>

Step 1: Preheat oven to 120°C. – Tip: A chemical change would mostly likely occur later

Chemical

Step 2: Place the cream, vanilla bean and seeds in a saucepan over medium heat and bring to scalding point, then remove from heat. Remove vanilla bean and discard.

Chemical

Step 3: Whisk together egg yolks and caster sugar in a bowl for 2-3 minutes or until pale.

Chemical

Step 4: Pour hot cream over egg yolk mixture, continuing to whisk until well combined. Strain mixture into a jug; evenly divide between 4 x 200ml ramekins.

Physical

Step 5: Carefully place ramekins in a deep roasting pan lined with a folded tea towel. Pour boiling water into pan to come halfway up the sides of ramekins. Cover pan loosely with foil.

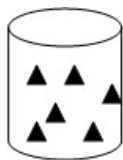
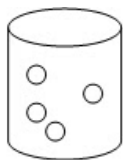
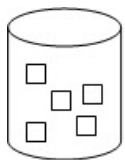
Chemical

Step 6: Bake in the oven for 40 minutes or until the custard has just set. Remove ramekins from the water bath, and set aside to cool.

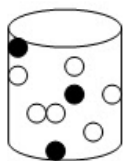
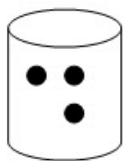
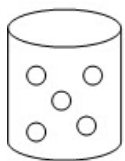
Physical

Chemical

Step 7: Sprinkle Demerara sugar evenly over the surface of the baked custards. Run a kitchen blowtorch over the custards, or place under a preheated grill until the sugar bubbles and caramelises. Serve.



Chemical

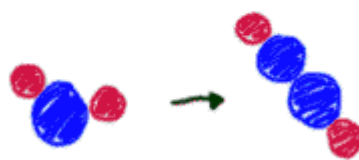


Physical

Physical



PHYSICAL CHANGE OF
WATER INTO ICE



CHEMICAL CHANGE OF
WATER INTO
HYDROGEN PEROXIDE

Chemical

In the classroom:

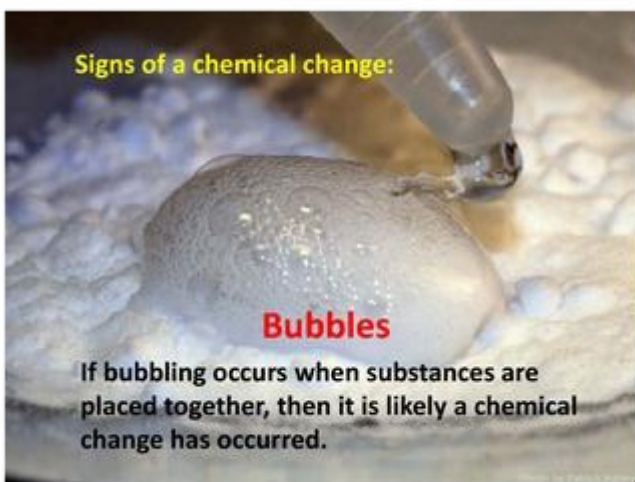
- View various pictures (or do thing physically) and discuss changes



What is a physical
and what is a
chemical change?

Why?

- Listen and learn the different songs available on YouTube
 - <http://www.youtube.com/watch?v=5yjEDihEuZI&feature=related>
 - <http://www.youtube.com/watch?v=uJOGy0dgmUU>
- Bake something like bread that involves many chemical changes and then discuss physical changes during the cutting of the bread.
 - <http://www.youtube.com/watch?v=D3l2MATH9R0>



Nice to
know